WHAT IS CLAIMED IS:

1. A pickup device for transferring to an adhesive side of an adhesive tape mounted on a wafer ring chips separated by dicing a wafer so as to adhere the chips thereon, and sequentially peeling the chips off the adhesive tape to be carried, comprising:

a thrusting mechanism configured to thrust the chips sequentially by using pins from a back side of the adhesive tape with the adhesive tape between the chips and the pins so as to peel the chips off the adhesive tape;

a carrying mechanism configured to sequentially absorb the chips with use of a collet, hold the chips to be absorbed until the chips are peeled off the adhesive tape, thereafter pick the chips up by ascending the collet in order to be carried the chips to a subsequent process stage; and

a controller configured to control the thrust of the chip by thrusting mechanism, the controller controlling an ascend time and a descend time of the pins, and keeping a predetermined period of a time when the pins arrive at their peak.

2. The pickup device according to claim 1, further comprising a wafer ring supporting mechanism configured to support the wafer ring; a chip position detecting mechanism configured to optically detect a position of the chip to be peeled off; and a moving

mechanism configured to move the pins of the thrusting mechanism to the position of the chip, which is detected by the chip position detecting mechanism.

3. The pickup device according to claim 1, wherein the adhesive tape is an organic film applied with adhesive on one side.

4. The pickup device according to claim 1, wherein the chips are separated by forming a half cut groove on an element forming face of the wafer along one of a dicing line and a chip separation line such that the groove does not penetrate through to a back side of the wafer and then grinding the back side of the wafer.

5. The pickup device according to claim 1, wherein when each of the chips is peeled off the adhesive tape the pins of the thrusting mechanism move from an original position such that a moving speed gradually increases and becomes constant thereafter, then decreases gradually to stop, then the pins back to the original position.

6. The pickup device according to claim 1, wherein a thickness of each of the chips is no more than 100 μm, and a speed at which the pins of the thrusting mechanism thrust the chips with the adhesive tape therebetween is set from 0.1 mm/second to 1 mm/second at a constant speed.

7. The pickup device according to claim 1,

wherein a stroke by which the pins of the thrusting mechanism thrust the chips with the adhesive tape therebetween is set within 0.1 to 2 mm.

8. The pickup device according to claim 1, wherein the controller controls the pins to halt the pins for 0.01 to 10 seconds when the pins arrive at their peak.

9. The pickup device according to claim 1, wherein the number of the pins of the thrusting mechanism is no less then five, and a distance of the narrowest space between the pins adjacent to each other is set within a range of 0.3 - 1 mm.

10. The pickup device according to claim 1, wherein the number of the pins of the thrusting mechanism is no less then five, and the pins are arranged such that there is at least one group of four pins an outer periphery of which is rectangular and two pairs of pins on diagonals of the rectangular are symmetrical with respect to an intersection of the rectangle with an error of 100 μm or less.

11. The pickup device according to claim 1, wherein the number of the pins of the thrusting mechanism is no less then five, and when centers of the outermost pins are connected to draw a drawing and enclose all the pins so as to put into a drawing having the same size as that of an outer periphery of each of the chips without protrusion, a distance from the

centers of the pins to the outer periphery of each of the chips is set at 1.5 mm or more.

12. The pickup device according to claim 1, wherein each of the pins of the thrusting mechanism has a hemisphere at a tip thereof, the radius of the hemisphere of the tip being set from 0.5 mm to 2 mm.

13. A method of manufacturing a semiconductor device adhering on an adhesive side of an adhesive tape chips separated by dicing a wafer, and sequentially peeling the chips off the adhesive tape to be carried, comprising:

thrusting the chips by using pins from a back side of the adhesive tape with the adhesive tape between the chips and the pins;

absorbing the chips by descending a collet from the adhesive side of the adhesive tape to contact the chips when the chips are peeled off the adhesive tape; and

causing the pins to keep thrusting, and picking the chips up by ascending the collet after the chips are peeled off the adhesive tape, in order to be carried the chips to a subsequent process stage.

14. The method of manufacturing a semiconductor device according to claim 13, prior to the thrusting the chips by using pins from the back side of the adhesive tape, optically detecting a position of one of the chips, which is to be peeled off;

moving the pins to the detected position of the one of the chips; and absorbing and holding an opposite side of the adhesive side of the adhesive tape.

15. The method of manufacturing a semiconductor device according to claim 13, further comprising forming a half cut groove on an element forming face of the wafer along one of a dicing line and a chip separation line such that the groove does not penetrate through to a back side of the wafer, and then grinding the back side of the wafer to separate the chips.

16. The method of manufacturing a semiconductor device according to claim 13, wherein when each of the chips is peeled off the adhesive tape the pins move from an original position such that a moving speed gradually increases and becomes constant thereafter, then decreases gradually to stop, then the pins back to the original position.

17. A pickup device comprising:

a thrusting mechanism having a backup holder and a pin holder configured to vertically move in the backup holder to thrust a chip adhered to an adhesive tape by using pins with the adhesive tape between the chip and pins;

a heating mechanism configured to heat the adhesive tape to decrease adhesion of the adhesive tape when the chip is peeled off the adhesive tape; and

an absorbing and carrying mechanism configured to

absorb and carry the chip thrust by the pins of the thrusting mechanism.

18. The pickup device according to claim 17, wherein the pin holder comprises capillaries flowing inert gas at a high temperature, and the backup holder has through holes formed at a position corresponding to positions of the pins of the pin holder and a position corresponding to positions of the capillaries of the pin holder.

19. The pickup device according to claim 18, further comprising a controller configured to control supply of the inert gas which starts immediately before or simultaneously with the start of a thrust operation of the pins.

20. A method of manufacturing a semiconductor device adhering on an adhesive side of an adhesive tape chips separated by dicing a wafer, and sequentially peeling the chips off the adhesive tape to be carried, comprising:

blowing inert gas at a high temperature to the adhesive tape simultaneously with or immediately before thrusting of thrusting pins to each of the chips so as to decrease adhesion of the adhesive tape; and

sequentially carrying the chips peeled off the adhesive tape.